Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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AC/DC Current Measurement Systems

TCPA300 • TCP312 • TCP305 • TCP303 • TCPA400 • TCP404XL Data Sheet

Features & Benefits

- AC/DC Measurement Capabilities
- DC – 100 MHz, Current Probe Amplifier (TCPA300) Uses:
  - DC – 100 MHz, 30 A DC (TCP312)
  - DC – 50 MHz, 50 A DC (TCP305)
  - DC – 15 MHz, 150 A DC (TCP303)
- DC – 50 MHz, Current Probe Amplifier (TCPA400) Uses:
  - DC – 2 MHz, 750*1 A DC (TCP404XL) (500 A DC Continuous)
- Automatic Scaling and Units*2 – Oscilloscope On-Screen Readout of Magnitude and Amps Reduces Measurement Errors with No More Hand Calculations
- AC/DC Input Coupling
- Low Insertion Impedance Reduces Device Under Test Loading
- Split-Core Construction Allows Easy Circuit Connection
- Status Indicators Provide Visual Operating Status and Notification of Potential Error Conditions – Degauss, Probe Open, Overload, Not Terminated into 50 Ohm, Noncompatible Probe Type
- Lower DC Drift and Noise Allows Improved Low-level Current Measurements
- Certified for use in U.S., Canada, and Europe. Complies with applicable IEC standards.

Applications

- Development and Analysis Solutions for Designers, Installers, and Service Personnel in Telecomm, Data Comm, Computer, and Semiconductor Power Electronics Environments For:
  - Power Supplies (Switching and Linear)
  - Semiconductor Devices (SCRs, IGBTs, MOSFETs, CMOS, BJTs)
  - Power Inverters/Converters
  - Electronic Ballasts
  - Industrial/Consumer Electronics
  - Mobile Communications (Phone, Satellite, Relay Stations)
  - Motor Drives
  - Transportation Systems (Electronic Vehicles, Electric Trains, Locomotives, Avionics)

Increased performance and simplicity

The TCP300 and TCP400 series AC/DC Current Measurement family is a highly advanced current measurement system for today's current measurement needs. The split-core probes incorporate both transformer and Hall-effect technology to provide broad bandwidth measurement capabilities from DC up to 100 MHz at current levels as low as 1 milliamp to thousands of amps (when used with CT4 current transformer). When connected to Tektronix Oscilloscopes with TEKPROBE Level II, TekConnect (w/ TCA-BNC) or TekVPI (w/ TPA-BNC) interfaces, current measurements and calculations are simple and easy.

Additional measurement power is available with add-on software such as the TDSPWR2 power measurements package. With all this measurement power, current measurements have never been easier.

*1 Derated with Duty Cycle

*2 Requires a TDS TEKPROBE Oscilloscope or a TekConnect Oscilloscope with TCA-BNC

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Tektronix®

Meets today's AC/DC current measurement applications

The TCPA300 amplifier, when used with TCP312, TCP305, or TCP303 probes, provide a wide range of current measurement capability and spans the gap between low-level milliamp measurements to very high current levels. These three probes provide current measurement capabilities of 30 A, 50 A, and 150 A DC continuous. For even higher current levels, the TCPA400 amplifier with the TCP404XL current probe measures 500 A DC continuous and 750 A DC continuous, derated with duty cycle.

Higher frequency performance is available with the TCP312 w/TCPA300 providing ≥100-MHz bandwidth and a maximum current of 30 A DC.

Measurement errors and manual calculations are now a thing of the past

With this new series of current measurement tools, automatic control and on-screen scaling and units is provided for users of Tektronix TDS3000, TDS500, TDS600, TDS700, TDS5000, TDS6000, and TDS7000B series oscilloscope systems (the DPO3000, DPO4000, and DPO7000 series oscilloscopes, the TPA-BNC adapter is required).

The TCP300/TCP400 Current Measurement Systems seamlessly integrate with your TDS series oscilloscope and the TDSPWR2 software package to easily make those time-consuming power measurements and calculations for you.

Even non-TEKPROBE systems can use the TCPA 300/400 series to make proper current measurements by simply multiplying the measured output voltage on the oscilloscope by the TCPA 300/400 series range setting.

Characteristics

	TCP312 w/ TCPA300	TCP305 w/ TCPA300	TCP303 w/ TCPA300	TCP404XL w/ TCPA400
Bandwidth (-3 dB)	DC – 100 MHz	DC – 50 MHz	DC – 15 MHz	DC – 2 MHz*[1]
Risetime	≤3.5 ns	≤7 ns	≤23 ns	≤175 ns
Maximum Current Ratings:				
High-Current Sensitivity Range	10 A/V Range	10 A/V Range	50 A/V Range	1 A/mV Range
DC (continuous)	30 A	50 A	150 A	500 A (750 A*[2])
RMS (sinusoidal)	21.2 A	35.4 A	150 A	500 A
Peak Pulse	50 A	50 A	500 A	750 A
Low-Current Sensitivity Range	1 A/V Range	5 A/V Range	5 A/V Range	N/A
DC (continuous)	5 A	25 A	25 A	
RMS (sinusoidal)	3.5 A	17.7 A	17.7 A	
Peak Pulse	50 A	50 A	500 A	
DC Accuracy (Operating temp 0 °C to 50 °C)	±3% of reading	±3% of reading	±3% of reading (10 °C to 50 °C) +3%/-6% of reading (0 °C to <10 °C)	±3% of reading
DC Accuracy, Typical (Operating temp 23 °C ±5 °C)	±1% of reading	±1% of reading	±1% of reading	±1% of reading
Nominal				
Maximum Bare Wire Voltage	For Use With Insulated Wires Only		600 V_{RMS} CAT I & II 300 V_{RMS} CAT III	
Lowest Measurable Current (at ±3% accuracy at DC)	1 mA	5 mA	5 mA	1 A
	Scope Set To 1 mV/div and 20 MHz BW Limited		*Scope Set To 1 mV/div and 20 MHz BW Limited*	
Insertion Impedance (See Curves Below)	0.08 Ω at 1 MHz 0.15 Ω at 10 MHz 0.27 Ω at 50 MHz 0.7 Ω at 100 MHz	0.035 Ω at 1 MHz 0.12 Ω at 10 MHz 0.4 Ω at 50 MHz	0.01 Ω at 1 MHz 0.025 Ω at 5 MHz 0.1 Ω at 15 MHz	0.1 mΩ at 10 kHz 0.6 mΩ at 100 kHz 8 mΩ at 1 MHz 16 mΩ at 2 MHz

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	TCP312 w/ TCPA300	TCP305 w/ TCPA300	TCP303 w/ TCPA300	TCP404XL w/ TCPA400
Typical				
Maximum Amp-Second Product (Based on Amplifier Range setting)	50 A*µS – 1 A/V 500 A*µS – 10 A/V	500 A*µS – 5 A/V NA – 10 A/V	3,000 A*µS – 5 A/V 15,000 A*µS – 50 A/V	NA – 1 A/mV
AC-Coupling Low-Frequency Bandwidth (Low Pass - 3 dB point)	<7 Hz			
Displayed RMS Noise (at 20-MHz Bandwidth Limit)	≤250 μA_{RMS}	≤1.25 mA_{RMS}	≤2.5 mA_{RMS}	≤250 mA_{RMS}
Signal Delay (Delay to Output BNC)	17 ns	19 ns	40 ns	80 ns
Inputs (probe amplifier)	1			
Probe Open Indicator	YES			
Overload Indicator	YES			
Termination Indicator	YES			
Noncompatible Probe Indicator	YES			
Safety Certifications				
U.S. NRTL Listing	UL3111-1 (Amplifier)		UL3111-2-032 ; UL3111-1 (Probe and Amplifier)	
Canadian Certification	CAN/CSA C22.2 No.1010.1 (Amplifier)		CAN/CSA C22.2 No.1010.2.032 CAN/CSA C22.2 No.1010.1 (Probe and Amplifier)	
European Union Compliance	EN61010-1/A2 (Amplifier)		EN61010-1/A2; EN61010-2-032 EN61010-1/A2 (Probe and Amplifier)	
Other	IEC61010-1/A2 (Amplifier)		IEC61010-2-032 IEC61010-1/A2 (Probe and Amplifier)	
Electromagnetic Compatibility	EC Council Directive 89/336/EEC, FCC Part 15, Subpart B Class A, AS/NZS 2064.1/2.			
Power Requirements (TCPA300/TCPA400 Amplifiers)	90 V to 264 V; 47 to 440 Hz; 50 W Maximum CAT II (Auto Switch)			
Power Requirements (Probes)	Requires TCPA300 Amplifier			Requires TCPA400 Amplifier
Probe Model	TCP312	TCP305	TCP303	TCP404XL
Warranty	1 Year			
Probe Mechanical Characteristics				
Probe Cable Length	1.5 meters (60 inches)		2 meters (78.7 inches)	8 meters (315 inches)
Probe Jaw Size (Max Conductor Size)	3.8 mm (0.15 inches)		21 mm × 25 mm (0.83 × 1.0 inches)	
Length	20 cm (7.87 inches)		26.8 cm (10.55 inches)	26.8 cm (10.55 inches)
Width	1.6 cm (0.625 inches)		4.1 cm (1.60 inches)	4.1 cm (1.60 inches)
Height	3.2 cm (1.25 inches)		15.6 cm (6.13 inches)	15.6 cm (6.13 inches)
Weight	0.15 kg (0.33 lbs.)		0.66 kg (1.45 lbs.)	0.88 kg (1.90 lbs.)
TCPA300 and TCPA400 Mechanical Characteristics				
Length	17.3 cm (6.8 inches)			
Width	16.7 cm (6.6 inches)			
Height	9.14 cm (3.6 inches)			
Weight	1.14 kg (2.5 lbs.)			

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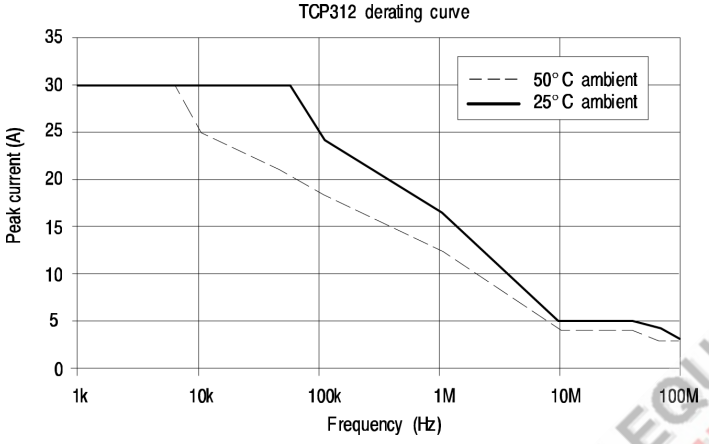
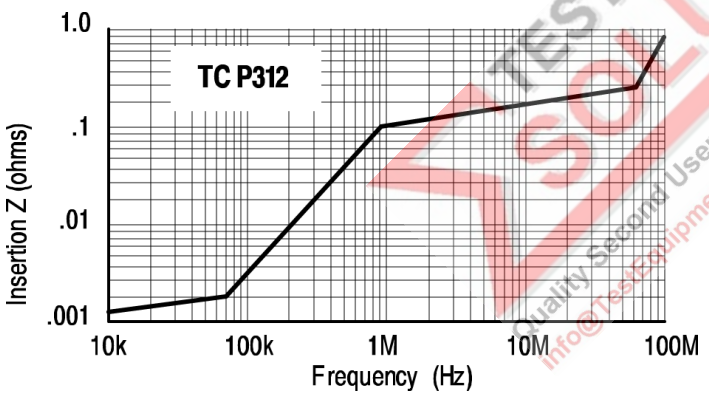
	TCP312 w/ TCPA300	TCP305 w/ TCPA300	TCP303 w/ TCPA300	TCP404XL w/ TCPA400
Environmental Characteristics				
Temperature - Operating	0 °C to +50 °C (32 °F to 122 °F)			
Temperature - Nonoperating	−40 °C to +75 °C (−40 °F to 167 °F)			
Humidity – Operating	5% to 95% R.H. to +30 °C (86 °F) 5% to 85% R.H. +30 °C to +50 °C (86 °F to 122 °F)			
Humidity – Nonoperating	5% to 95% R.H. to +30 °C (86 °F) 5% to 85% R.H. +30 °C to +75 °C (86 °F to 167 °F)			
Altitude – Operating	2000 m (6800 ft.) maximum			
Altitude – Nonoperating	12,192 m (40,000 ft.) maximum			

*1 Calculated from Risetime

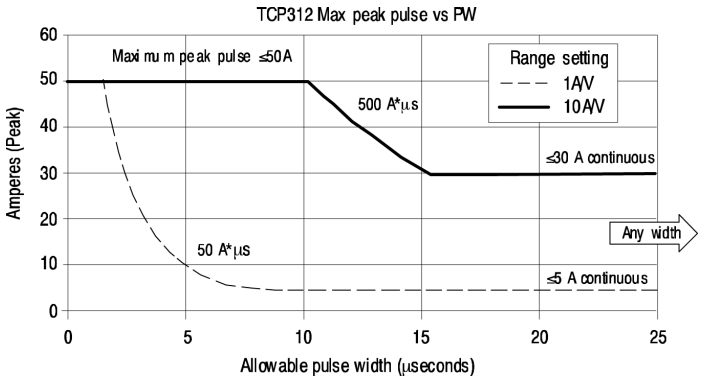
*2 Derated w/ duty cycle and frequency



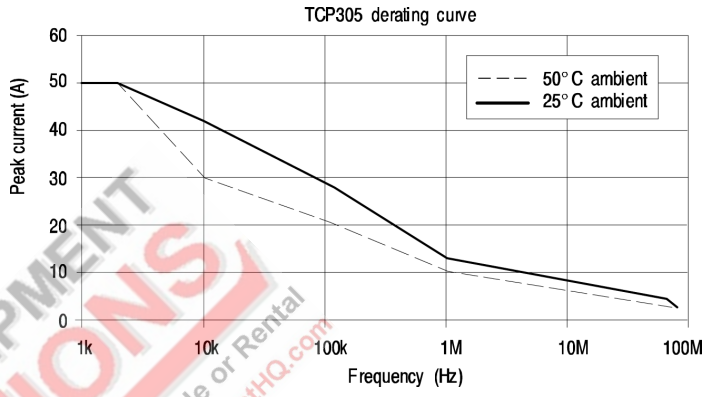
TCP312 Typical Peak Current Frequency Derating Curve



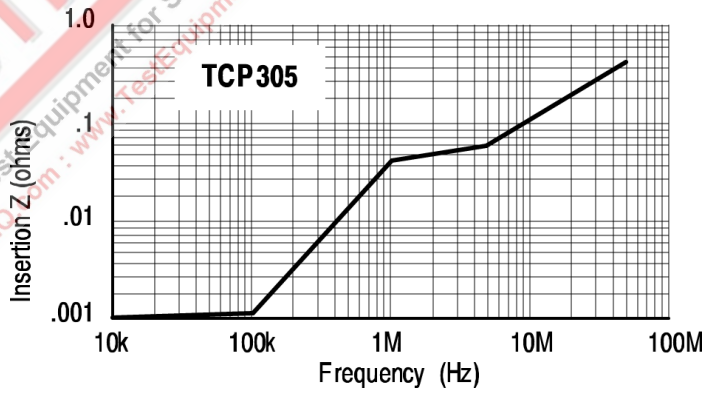
TCP312 Typical Insertion Impedance Curve



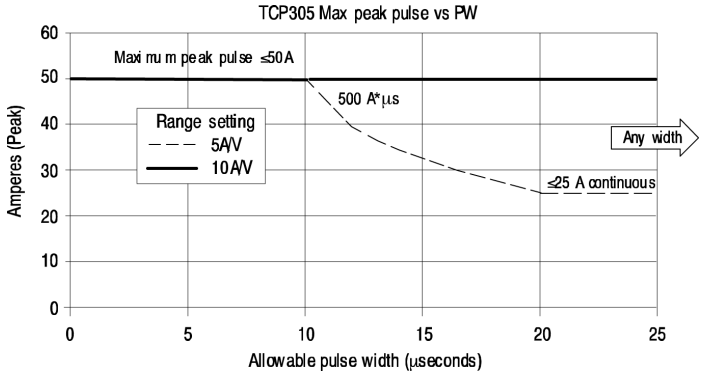
TCP312 Typical Specified Operating Area Characteristics



TCP305 Typical Peak Current Frequency Derating Curve



TCP305 Typical Insertion Impedance Curve



TCP305 Typical Specified Operating Area Characteristics

(Note: At 23 °C ambient , 600 A may be measured continuously with the TCP404XL probe.)

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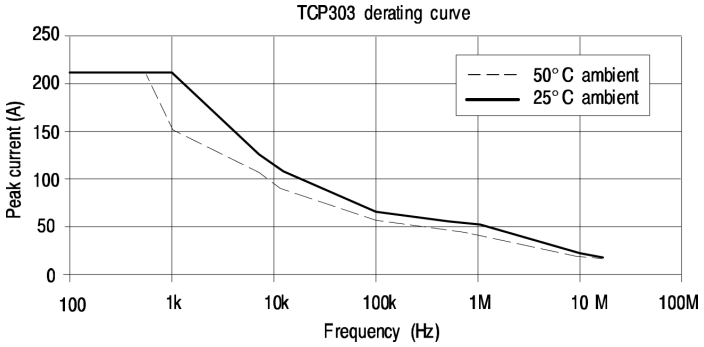
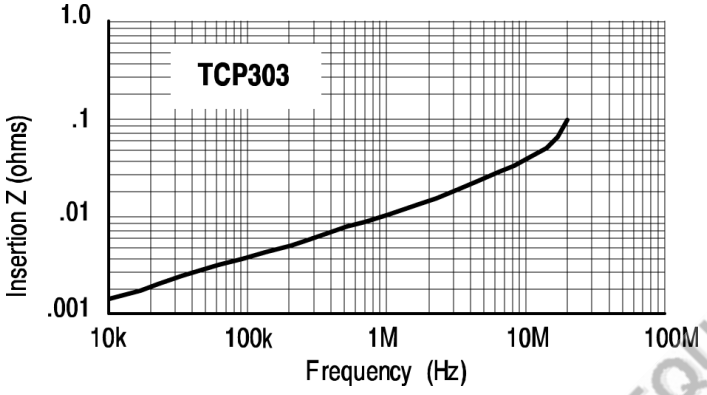
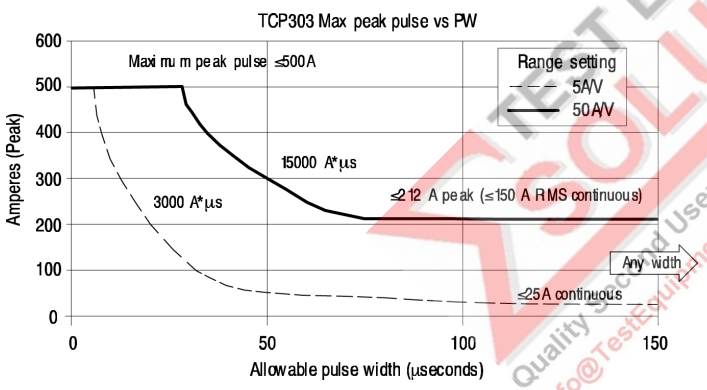


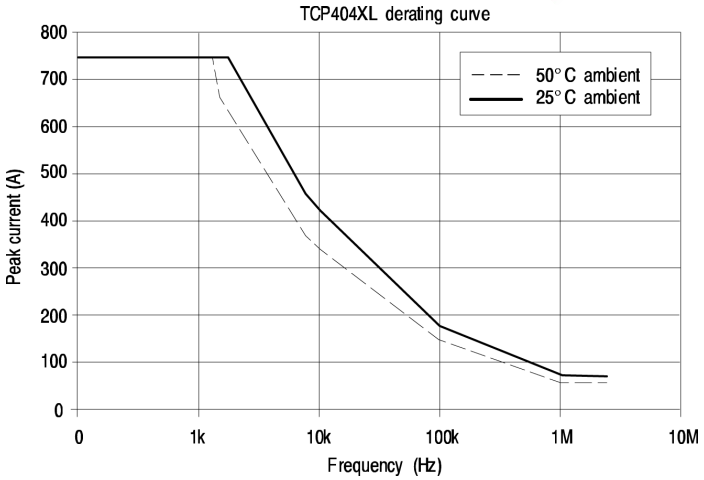
TCP303 Typical Peak Current Frequency Derating Curve



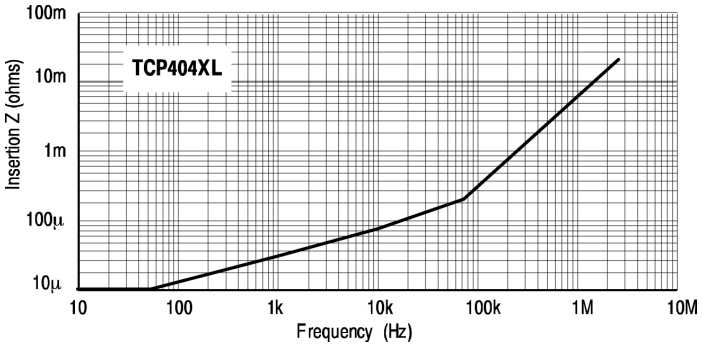
TCP303 Typical Insertion Impedance Curve



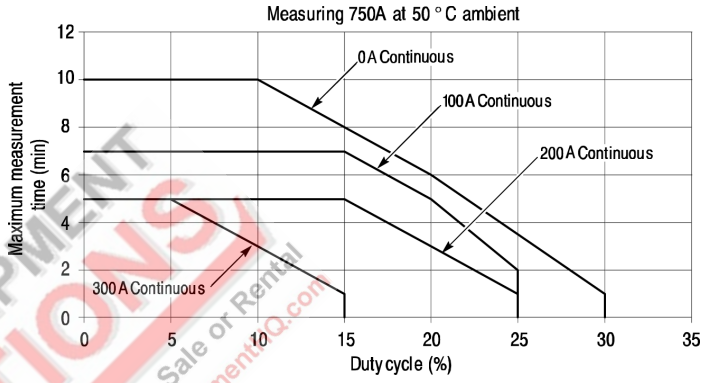
TCP303 Typical Specified Operating Area Characteristics



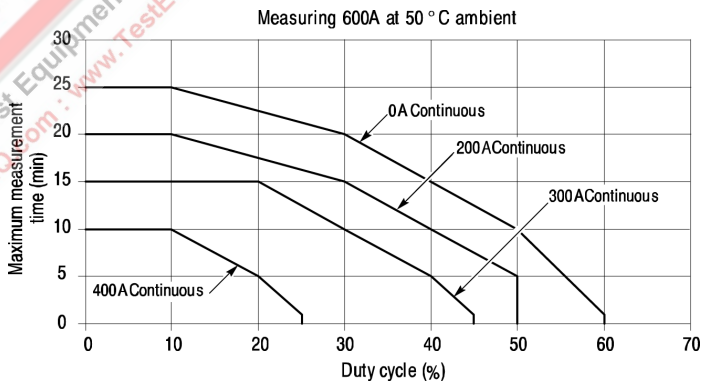
TCP404XL Typical Peak Current Frequency Derating Curve



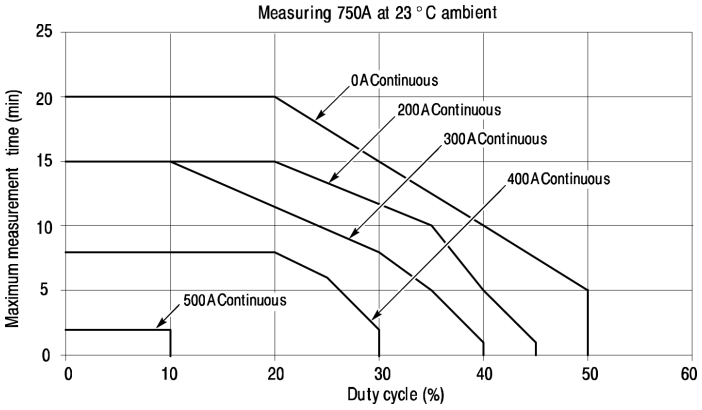
TCP404 Typical Insertion Impedance Curve



TCP404XL Maximum Current Measurement Time (750 A at 50 °C Ambient)



TCP404XL Maximum Current Measurement Time (600 A at 50 °C Ambient)



TCP404XL Maximum Current Measurement Time (750 A at 23 °C Ambient)

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Ordering Information

TCP312
Probe; AC/DC Current, DC to 100 MHz; 30 A DC (Requires TCPA300 Amplifier)

TCP305
Probe; AC/DC Current, DC to 50 MHz; 50 A DC (Requires TCPA300 Amplifier)

TCP303
Probe; AC/DC Current, DC to 15 MHz; 150 A DC (Requires TCPA300 Amplifier)

TCP404XL
Probe; AC/DC Current, DC to 2 MHz; 500 A DC (750 A DC Derated With Duty Cycle) (Requires TCPA400 Amplifier)

All TCP300/TCP400 Current Probes Include: AC/DC Current Probe; Instruction Sheet; Probe Cover; Certificate of Traceable Calibration

TCPA300
Amplifier; AC/DC Current Probe, DC to 100 MHz, (Requires TCP305 or TCP312 or TCP303 Probes)

TCPA400
Amplifier; AC/DC Current Probe, DC to 50 MHz, (Requires TCP404XL Probe)

All TCPA300/TCPA400 Current Probe Amplifiers Include: AC/DC Current Probe Amplifier; Instruction/Service Manual; TEKPROBE Interface Cable; Male to Male BNC cable (50 Ω); 50 Ω feed-through termination; Certificate of Traceable Calibration

Options

TCPA300/TCPA400

Power Plug Options
Opt. A1 – Euro Plug, 220 V, 50 Hz
Opt. A2 – UK Plug, 240 V, 50 Hz
Opt. A3 – Australian Plug, 240 V, 50 Hz
Opt. A5 – Swiss Plug, 220 V, 50 Hz
Opt. A6 – Japanese Plug, 100 V, 110/120 Volt, 60 Hz
Opt. AC – China Plug, 50 Hz
Opt. A99 – No Power Cord

Language Options
L5 – Japanese Manual

All TCP300/TCPA300/TCP400/TCPA400 Series

Service Options
Opt. C3 – Calibration Service 3 Years
Opt. C5 – Calibration Service 5 Years
Opt. D1 – Calibration Data Report
Opt. D3 – Calibration Data Report 3 Years (with Option C3)
Opt. D5 – Calibration Data Report 5 Years (with Option C5)
Opt. R3 – Repair Service 3 Years
Opt. R5 – Repair Service 5 Years

Protective covers

RECOMMENDED ACCESSORIES

016-1923-00 – Cover, Small Probe Protective; (for TCP305, TCP312, A6302, A6302XL, A6312, TCP202)

016-1924-00 – Cover, Large Probe Protective; (for TCP303, TCP404XL, A6303, A6303XL, A6304XL)

016-1922-00 – Case, Transit; Current Measurement Systems

011-0049-02 – 50 Ω Feed Through Termination

012-0117-00 – 50 Ω BNC To BNC Coaxial Cable

012-1605-00 – TEKPROBE Interface Cable, TCPA300 or TCPA400 Amplifier to TDS series oscilloscopes

015-0601-50 – Current Loop, 1 Turn, 50 Ω, BNC Connector (for TCP305, TCP312, A6302, A6302XL A6312, TCP202, TCP303, A6303, A6303XL)

174-4765-00 – TCPA300/TCPA400 Amplifier Calibration Adapter

067-1478-00 – Power Measurements Deskew Fixture, For TCP202, TCP305, TCP312, TCP303, A6302, A6312, A6303, Series Probes

CT4 – AC Current Transformer, 20 kA (for use with TCP305, TCP312, TCP202, A6302, A6312)

TDSPWR2 – Power Measurement and Analysis Software for TDS5000 and TDS7000 Series Oscilloscopes
To order when purchasing oscilloscope:
Order: TDS5052PW2, TDS5054PW2, TDS7054PW2,TDS7104PW2.
To order as Upgrade:
Order: TDS5UP PW2, TDS7UP PW2.

CE

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Product(s) are manufactured in ISO registered facilities.

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03 Feb 2009 60W-16458-2